

## CLAIMS

We Claim:

1        1. A method for selecting a sub model, the method comprising the  
2 following steps:

3            (a) obtaining first information about a presenting issue from a user;

4            (b) using the first information within a supermodel to identify an

5 underlying issue and an associated sub model for providing a solution to the

6 underlying issue, including the following substeps:

7                (b.1) using a Bayesian network structure to identify the  
8 underlying issue and the associated sub model;

9                (c) obtaining, by the sub model, additional information about the  
10 underlying issue from the user; and,

11                (d) using the additional information by the sub model to identify a  
12 solution to the underlying issue.

1        2. A method as in claim 1 wherein in step (a) the first information

2 pertains to product diagnosis.

1        3. A method as in claim 1 wherein in step (a) the first information

2 pertains to decision support.

1        4. A method as in claim 1 wherein in step (a) the first information

2 pertains to selection.

1        5. A method as in claim 1 wherein in step (a) the first information  
2 pertains to classification.

1        6. A method as in claim 1 wherein in step (a) the first information  
2 pertains to prediction.

1        7. A method as in claim 1 wherein in step (a) the first information  
2 pertains to brokering.

1        8. A method as in claim 1 wherein in step (a) the first information  
2 pertains to brokering of stocks in companies.

1        9. A method as in claim 1 wherein step (d) includes the following  
2 substep:

3            (d.1) using the additional information by the sub model to identify an  
4 underlying sub issue and an associated sub model for providing a solution to  
5 the underlying sub issue.

1        10. A method as in claim 1 wherein in step (a) each sub model provides  
2 the following to the super model:

3            a probability that a solution to the underlying issue provided by the  
4 sub model will solve the presenting issue given current evidence;

5            a cost of the sub model solving the presenting issue given the current  
6 evidence; and,

7 a measure of belief in the sub model being a correct model to handle  
8 the presenting issue given the current evidence.

1 11. A method as in claim 1 wherein step (d) includes the following  
2 substeps:

3 (d.1) determining whether available information is sufficient to identify  
4 the solution to the underlying issue;

5 (d.2) if in substep (d.1) the available information is sufficient to identify  
6 the solution to the underlying issue, communicating the solution to the user;

7 and,

8 (d.3) if in substep (d.1) the available information is not sufficient to  
9 identify the solution to the underlying issue, determining whether to return  
10 control from the sub model to the supermodel or to obtain more information  
11 by the sub model from the user.

1 12. A method as in claim 11 wherein in substep (d.3) control is  
2 returned from the sub model to the supermodel when the supermodel  
3 determines efficiency of the sub model is no longer highest among available  
4 sub models.

1 13. A method as in claim 11 wherein in substep (d.3) control is  
2 returned from the sub model to the supermodel when the sub model  
3 determines a conflict measure crosses a predetermined threshold.

1        14. A method as in claim 1 wherein step (d) includes the following

2        substeps performed by the sub model:

3            (d.1) generating a probability of one or more issues;

4            (d.2) generating one of a next question and a next test; and

5            (d.3) generate a probability of each possible answer of the one of the

6        next question and the next test, based on information known to the sub

7        model.

1        15. A method as in claim 1 wherein in substep (b.1) the Bayesian

2        network structure includes nodes for underlying issues that cause the

3        presenting issue and for each presenting issue a sub model to be used to

4        attempt to provide a solution to the underlying issue.

1        16. A method as in claim 15 wherein in substep (b.1) for each

2        underlying issue one and only one sub model is listed in the Bayesian

3        network.

1        17. A method as in claim 15 wherein in substep (b.1) for each

2        underlying issue there can be more than one sub model listed in the Bayesian

3        network.

1        18. A method as in claim 1 additionally comprising the following step:

2            (e) allowing the user to specify at least one of the following:

3                a minimum required probability before a sub model is selected

4        by the supermodel;

5                   a requirement that all available questions be asked by the  
6 supermodel before a sub model is selected;  
7                   a cost for calling a service representative;  
8                   whether jumping in and out of sub models dynamically is  
9 allowed;  
10                  a minimum required probability of “Other issue” before a sub  
11 model is abandoned;  
12                  an additional cost of switching models.

1                  19. A system for performing selecting among sub models, the system  
2 comprising:

3                  a supermodel for obtaining first information about a presenting issue  
4 from a user, the supermodel being implemented using a Bayesian network  
5 structure; and,  
6                  a plurality of sub models, each sub model, when activated, obtaining  
7 additional information about an underlying issue from the user, the  
8 additional information being used by the sub model to identify a solution to  
9 the underlying issue;

10                 wherein the supermodel uses the first information to identify the  
11 underlying issue and one of the plurality of sub models for providing a  
12 solution to the underlying issue.

1                  20. A system as in claim 19 wherein the first information pertains to  
2 product diagnosis.

1        21. A system as in claim 19 wherein the first information pertains to  
2 decision support.

1        22. A system as in claim 19 wherein the first information pertains to  
2 selection.

1        23. A system as in claim 19 wherein the first information pertains to  
2 classification.

1        24. A system as in claim 19 wherein the first information pertains to  
2 prediction.

1        25. A system as in claim 19 wherein the first information pertains to  
2 brokering.

1        26. A system as in claim 19 wherein the first information pertains to  
2 brokering of stocks in companies.

1        27. A system as in claim 19 additionally comprising:  
2            a second plurality of sub models, the additional plurality of sub models  
3            being used by the plurality of sub models for providing solutions to  
4            underlying sub issues identified by the plurality of sub models, thereby  
5            forming a hierarchy of sub models.

1        28. A system as in claim 19 wherein each sub model provides the

2 following to the super model:

3        a probability that a solution to the underlying issue provided by the

4 sub model will solve the presenting issue given current evidence;

5        a cost of the sub model solving the presenting issue given the current

6 evidence; and,

7        a measure of belief in the sub model being a correct model to handle

8 the presenting issue given the current evidence.

1        29. A system as in claim 19 wherein when activated each sub model

2 determines whether available information is sufficient to identify the solution

3 and if so identifies the solution to the underlying issue.

1        30. A system as in claim 19 wherein each sub model returns control to

2 the supermodel when the supermodel determines efficiency of the sub model

3 is no longer highest among available sub models.

1        31. A system as in claim 19 wherein each sub model returns control to

2 the supermodel when the sub model determines a conflict measure crosses a

3 predetermined threshold.

1        32. A system as in claim 19 wherein each sub model generates a

2 probability of one or more issues, generates one of a next question and a next

3 test, and, generates a probability of each possible answer of the one of the

4 next question and the next test, based on known information.

1       33. A system as in claim 19 wherein the Bayesian network structure  
2 includes nodes for underlying issues that cause the presenting issue and  
3 includes for each presenting issue a sub model to be used to attempt to  
4 provide a solution to the underlying issue.

1       34. A system as in claim 33 wherein for each underlying issue one and  
2 only one sub model is listed in the Bayesian network.

1       35. A system as in claim 33 wherein for each underlying issue there  
2 can be more than one sub model listed in the Bayesian network.

1       36. A system as in claim 19 wherein the supermodel allows the user to  
2 specify at least one of the following:  
3               a minimum required probability before a sub model is selected  
4               by the supermodel;  
5               a requirement that all available questions be asked by the  
6               supermodel before a sub model is selected;  
7               a cost for calling a service representative;  
8               whether jumping in and out of sub models dynamically is  
9               allowed;  
10              a minimum required probability of “Other issue” before a sub  
11              model is abandoned;  
12              an additional cost of switching models.